R E P O R T R E S U M E S

ED 018 637 VT 003 616

A GUIDE FOR PREPARING COURSES OF INSTRUCTION IN VOCATIONAL AGRICULTURE IN MICHIGAN.

MICHIGAN ST. DEPT. OF PUBLIC INSTR., LANSING
REPORT NUMBER MSBE-BULL-2151 PUB DATE 66
EDRS PRICE MF-$0.25 HC-$1.00 23P.

DESCRIPTORS- *VOCATIONAL AGRICULTURE, COURSE CONTENT, OCCUPATIONAL CLUSTERS, HIGH SCHOOLS, *EDUCATIONAL OBJECTIVES, *CURRICULUM DEVELOPMENT, AGRICULTURAL SKILLS,

THE MAJOR OBJECTIVES OF THIS DOCUMENT ARE TO ASSIST VOCATIONAL AGRICULTURE TEACHERS IN DEVELOPING COURSES OF INSTRUCTION DESIGNED TO MEET THE NEEDS OF PERSONS PREPARING FOR GAINFUL EMPLOYMENT IN AGRICULTURE, AND TO HELP THOSE CURRENTLY EMPLOYED IN AGRICULTURE WHO WISH TO IMPROVE AND ADVANCE IN THEIR OCCUPATION. A CHART SHOWING A FLEXIBLE 4-YEAR HIGH SCHOOL PROGRAM FOR VOCATIONAL AGRICULTURE OFFERING BASIC AGRICULTURAL INSTRUCTION IN GRADES NINE AND 10 AND MORE SPECIALIZED OCCUPATIONAL TRAINING DURING GRADES 11 AND 12 IS PRESENTED AND EIGHT ADMINISTRATIVE AND 17 OPERATIONAL GUIDING PRINCIPLES FOR CURRICULUM CHANGE ARE LISTED. MAJOR OBJECTIVES OF VOCATIONAL AGRICULTURE EDUCATION CONCERN DEVELOPING (1) AGRICULTURAL COMPETENCIES NEEDED TO ENGAGE IN PRODUCTION AGRICULTURE AND OTHER AGRICULTURAL OCCUPATIONS, (2) AN UNDERSTANDING AND APPRECIATION OF CAREER OPPORTUNITIES AND PREPARATION NEEDED, (3) THE ABILITY TO SECURE SATISFACTORY PLACEMENT, AND (4) HUMAN RELATIONS SKILLS AND ATTITUDES, LEADERSHIP ABILITIES, AND CIVIC RESPONSIBILITIES. JOB TITLES AND COMPETENCIES ARE LISTED FOR AGRICULTURAL MACHINERY SALES AND SERVICE, SUPPLIES AND EQUIPMENT, LANDSCAPE HORTICULTURE, AGRICULTURAL SERVICE, FORESTRY AND SOIL CONSERVATION, DAIRY MANUFACTURING AND PROCESSING, LIVESTOCK MARKETING AND PROCESSING, OTHER LIVESTOCK INDUSTRY, POULTRY INDUSTRY, CROPS MARKETING AND PROCESSING, WILDLIFE AND RECREATION, AND FARM SERVICE. A THREE-PAGE BIBLIOGRAPHY IS INCLUDED. (WB)

ED018637

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

A GUIDE FOR PREPARING COURSES OF INSTRUCTION IN VOCATIONAL AGRICULTURE IN MICHIGAN

Bulletin No. 2151

Published by

STATE BOARD OF EDUCATION
DEPARTMENT OF EDUCATION
Division of Vocational Education
Lansing, Michigan
1966

VT003616

STATE BOARD OF EDUCATION

	Term expires December 31,
Thomas J. Brennan, President Detroit	1970
Dr. Leon Fill, Vice President Detroit	1966
Rev. Charles E. Morton, Treasurer Detroit	1972
Dr. Edwin L. Novak, Secretary Flint	1972
Carmen DelliQuadri Houghton	1968
Miss Marilyn Jean Kelly Ann Arbor	1968
Dr. Peter Oppewall Grand Rapids	1970
Donald M. D. Thurber Detroit	1966

Alexander J. Kloster, Acting Superintendent
Chairman, Member Ex-Officio

George Romney, Governor
Member, Ex-Officio

PREFACE

This document is prepared to assist teachers of vocational agriculture in developing courses of instruction designed to meet the needs of persons preparing for gainful employment in the broad field of agriculture. Helps are also provided for those currently employed in agriculture and who wish to improve and advance in their chosen occupation.

It consolidates suggestions and materials included in The High School Course of Study for 1964-65, developed by the following committee: Dr. Raymond Garner, Chairman, Michigan State University; Dr. Harold Byram, Michigan State University; Mr. Carl Nelson, Supervising Teacher, St. Charles High School; Mr. Charles Langdon and Mr. Clifford Haslick, Consultants, Michigan Department of Education. In addition it incorporates research relating to occupational families in agriculture together with competencies needed by persons employed in these occupations.

To assist teachers further, sources of materials relating to agricultural occupations are provided. We believe teachers of vocational agriculture will find this document valuable as they plan their courses of instruction. Further revisions are planned and will be made as new helps become available.

TABLE OF CONTENT

PAGE

INTRODUCTION. 1

CHART OF SUGGESTED HIGH SCHOOL VOCATIONAL AGRICULTURE PROGRAM 2

GUIDING PRINCIPLES FOR CURRICULUM CHANGES 3

MAJOR OBJECTIVES OF VOCATIONAL AGRICULTURE EDUCATION. 5

GREATER USE OF INDIVIDUAL STUDY 9

OCCUPATIONAL FAMILIES IN AGRICULTURE AND JOB TITLES 9

AREAS OF AGRICULTURAL COMPETENCY MOST NEEDED IN VARIOUS OCCUPATIONAL FAMILIES 11

BIBLIOGRAPHY. 16

INTRODUCTION

For many years those associated with agriculture have recognized that this basic industry includes much more than the production of food and fiber. It is now an accepted fact that businesses, industries, and services are a part of agriculture where competencies are required in one or more areas of plant science, animal science, soil science, agricultural business management, and agricultural mechanics.

Passage of the Vocational Education Act of 1963 and subsequent state legislation now encourages providing training for all agricultural occupations.

The chart on page 2 is a suggested program for high school students in vocational agriculture covering a four-year period. It provides for maximum flexibility. The first two years are considered basic to agricultural occupations. Courses during these years are designed for students in the ninth and tenth grades; however, there are no barriers which keep students from other grade levels from enrolling in them. In fact, students at any grade level may select the courses which best fulfill their needs and enroll for that period of time in which instruction offered contributes to their occupational objective and provides the skills needed for entry into a job. While a basic core of instruction is suggested in each of the courses offered, it is recognized that there is need for some cross-section teaching and, at the ninth grade level, need for a well balanced orientation period which permits the development and expansion of supervised agricultural experience programs that have significance.

The third and fourth year programs are designed to develop skills, abilities, and attitudes for specialized occupations in agriculture.

Courses are planned on a semester basis, permitting students to select those courses in which they have a definite interest and need for occupational preparation. Those listed as specialized courses are suggestions only and others more appropriate in terms of need and employment opportunities should be substituted. No one school will be able to offer all the unit courses suggested during a single year. Neither is it anticipated that these courses will be terminal, although it is recognized that they will be terminal for students who are preparing for immediate job entry.

The content of the programs at the eleventh and twelfth grade levels in the non-farm agriculture courses should be based on such factors as: 1. Types of available employment opportunities. 2. Aspirations and preferences of students. 3. Competence of available teachers. 4. Facilities available. 5. Agriculture economy of the area.

CHART OF SUGGESTED HIGH SCHOOL VOCATIONAL AGRICULTURE PROGRAM

Curriculum	Grade Level	Courses	Length	Participating Experiences: FFA Activities	Participating Experiences: Supervised Practice Experience
Basic	9th	Applied Plant Science - Plant growth, propagation and improvement as applied to agriculture	Semester Basis	FFA	Supervised Farming Land Laboratory Group Projects Farm Placement Greenhouse Nurseries
		Applied Soil Science - Properties of soils in relation to plant growth	Semester Basis		
	10th	Applied Animal Science - Basic principles of animal production	Semester Basis	FFA	Same
		Applied Agricultural Mechanics	Semester Basis		
Specialized	11th and 12th	Agriculture Production Courses: Advanced Agricultural Mechanics; Agricultural Business Management; Crop; Poultry; Beef; Dairy	Semester Basis	FFA	Supervised Farming or Supervised On The Job Agricultural Experience
	11th and 12th	Non-Farm Agriculture Courses*: Forestry or Soil Conservation; Agricultural Services; Nursery Production Gardening; Landscape Horticulture; Agri-Business Management; Farm Power and Machinery	Semester Basis	FFA	Supervised Farming or Supervised On The Job Agricultural Experience

*Courses listed are a part of various occupational families in agriculture. These families and competencies needed by workers in them are identified on pages 9 to 15. Courses planned should include instruction involving competencies relating to the occupational family of which it is a part.

In initiating the above programs, it may be necessary to make changes in the present curriculum in vocational agriculture. In order to assist in bringing about an orderly change, certain principles should be followed which serve as a guide in planning basically sound programs. The principles which follow relate to both the administrative and operational aspects of curriculum change in high school and post-high school programs.

GUIDING PRINCIPLES FOR CURRICULUM CHANGE

Administrative

1. The occupational needs of the persons receiving instruction should be considered first when planning new and improved vocational-technical education programs.

2. Sufficient flexibility should be provided for the student to pursue a program meeting his or her needs without regard to administrative lines between vocational educational services.

3. Vocational agriculture should provide basic education in agriculture in preparation for further education for students interested in employment in the broad field of agriculture. At the same time, it should be of sufficient scope and quality to provide as sound a program as possible for those terminating their education with high school graduation or before and who plan to enter employment in agriculture.

4. Any boy or girl with a vocational interest in an occupation in agriculture should be enrolled in vocational agriculture regardless of home background or experience. An appropriate agricultural experience program should then be provided, with placement of students in an agricultural occupation or in supervised farming programs. This program may include activities involving work of the farm or farm home, the land laboratory, school farm or greenhouse and various production group projects.

5. Where possible, instruction should be given in local high schools, area schools, junior colleges, community colleges and other such institutions so that all students who desire may have the opportunity to enroll.

Operational

1. Vocational agriculture should provide a background in many phases of agriculture, specialized education and training in specialized occupations where needed.

2. An advisory committee should be organized to assist in the development of training programs in the broad field of agriculture.

3. Continuing emphasis needs to be given to the teaching of applied scientific principles undergirding approved practices in agriculture.

4. The length of courses of instruction should be based upon the training requirements for the occupation and educational needs of the students. A core course of from one to four years in length should be developed in agriculture for students who wish to prepare for entry into farming and other agricultural occupations, including the agricultural professions.

5. Agricultural mechanics courses should provide students with skills, understandings, and occupational information needed for future work in agriculture.

6. Any student interested in agriculture as a career should have an equal opportunity to participate and advance in FFA.

7. Farming is a basic industry and schools have a continuing responsibility to provide training for entering farming as one of the major objectives of vocational agriculture.

8. Students who are preparing for productive farming should be required to conduct a supervised farming program on a farm for experience.

9. Group projects, including FFA cooperative activities and activities on land laboratories should be organized to provide exploratory experiences in basic understandings and abilities needed as a foundation for non-farm and farming occupations.

10. Schools should provide a cooperative-type occupational training program as one means for giving specific training to help selected students acquire the necessary skills, abilities and understandings to succeed in a variety of non-farm agricultural occupations.

11. When students are placed for experience on a farm or in an agricultural business establishment, a written agreement should be developed between the student, the parents, the teacher, and the employer.

12. The teacher of vocational agriculture should be encouraged to aid in and coordinate the placement of students in farming and other agricultural occupations.

13. Arrangements should be made by school personnel for instruction and coordination on the job to supplement instruction at school.

14. It should be recognized that training for non-farm agricultural occupations is not the exclusive concern of the teacher of vocational agriculture. Teachers of many other high school subjects have substantial contributions to make to the career preparation of workers in non-farm agricultural occupations.

15. Some of the major outcomes of instruction in vocational agriculture to prepare students to enter non-farm agricultural occupations include providing:

    a. More complete occupational information and assisting students in making occupational choices.

    b. Basic knowledge of agriculture which will be helpful to students who decide to work in a non-farm agricultural occupation.

    c. Specific agriculture knowledge and skills for job entry in agricultural occupations.

    d. Supervised agricultural experience through cooperative training or similar programs to help students become established in an agricultural occupation.

    e. Basic instruction in agriculture for students planning to take post-high school training to enter a technical or professional occupation in agriculture.

16. Competencies and understandings in agriculture needed by workers in non-farm agricultural occupations should be considered when selecting and developing units for the course of study in vocational agriculture.

17. Teaching units on agricultural occupations should include:

    The scope and nature of agricultural occupations.

    Detailed group study of selected occupations and occupational families, including educational requirements.

    Study of selected occupations on an individual basis considering educational requirements, and series of choices for a career plan.

    Detailed instruction on skills and abilities required to enter an agricultural occupation.

    Individual conferences regarding implementation of a career plan. Coordination of placement of students in agricultural occupations.

MAJOR OBJECTIVES OF VOCATIONAL AGRICULTURE EDUCATION

Programs should be developed which provide education and training needed by "persons of all ages in all communities" to prepare them for gainful employment in agriculture. Specifically, vocational agriculture is concerned with students enrolled in secondary schools and out-of-school youth and adults who wish full-time vocational and technical training in agriculture for entry into occupations in this field. In addition, it is concerned with employed youth and adults who seek to up-grade their occupational performance through additional training in agriculture.

In view of the broad function which vocational agriculture must perform, the following are approved as major objectives.[1]

Objective 1. To develop agricultural competencies needed by individuals engaged in or preparing to engage in production agriculture

The attainment of this major objective requires competencies in one or more areas of plant science, animal science, soil science, agricultural business management, and agricultural mechanization.

On the high school level it is anticipated that students planning a life's work as an owner, operator or manager in production agriculture should pursue a four year program. The first two years would be somewhat exploratory in nature and would include a scientific approach to the study of soil, plants and animals as applied to agriculture. A semester in agricultural mechanics is also recommended.

It is recognized that there are several different occupational levels at which individuals are engaged in production agriculture. Therefore, the knowledge and skills needed by workers in these various levels (owner-operators, managers, or workers) will vary. Consequently, educational programs designed to prepare them

---

[1] Prepared by a National Committee of State Supervisors, Teacher Educators, and Representatives of the National Association of Teachers of Vocational Agriculture, 1964.

for their particular work must also vary in length and level of instruction, depending upon the occupational requirements.

The specialized courses in the eleventh and twelfth grade level should establish specific teaching objectives on the basis of the abilities required of an individual to perform specific production agriculture operations satisfactorily. The following contributory objectives are applicable to farmers who produce food and fiber and to operators of greenhouses who produce flowers, food, plants, and ornamental stock. They also apply to individuals who are involved in the business of producing trees and nursery stock or in landscaping and maintaining grounds.

1. Begin and advance in production agriculture;

2. Manage an agricultural business effectively and efficiently;

    a. Produce agricultural products efficiently;
    b. Market agricultural products advantageously;
    c. Finance an agricultural business;
    d. Provide for efficient agricultural buildings and mechanization;
    e. Make decisions based upon the analysis of accurate and proper records;
    f. Conserve soil and other natural resources;
    g. Apply effective employee-employer relationships;

3. Maintain a favorable environment in the home and the community.

Objective 2. To develop competencies needed by individuals engaged in or preparing to engage in agricultural occupations other than production agriculture

The efficient production of agricultural commodities requires many products and services which are usually provided by specialized businesses. Therefore, appropriate educational programs must be designed for those who are engaged in or will engage in other agricultural occupations--the processing, distribution, and service segments of agriculture.

Contributory objectives necessary to the attainment of this major objective include the effective ability to:

1. Understand and apply the principles of soil science, plant science, animal science, management, and mechanization as they relate to agricultural occupations;

2. Perform the managerial and operative skills necessary to enter and progress in an agricultural occupation;

    a. Understand how agricultural businesses are financed;
    b. Market products and provide related services;
    c. Understand employee role expectations;
    d. Understand employer policies and procedures;
    e. Respect and wisely use the property of the employer;
    f. Maintain and interpret records;
    g. Prepare reports;
    h. Analyze and project sales potential;
    i. Understand, interpret, and follow memoranda, manuals, and written policies and regulations;
    j. Understand the functions of specific agricultural business operations in the free enterprise system.

Objective 3. To develop an understanding and appreciation of career opportunities in agriculture and of the preparation needed to enter and progress in agricultural occupations.

Modern agriculture is broad and complex, involving hundreds of professional, technical, and vocational occupations which require extensive knowledge and highly developed skills for successful performance. This means that individuals aspiring to enter and/or progress in agricultural occupations should become knowledgeable concerning the types of jobs and their characteristics, such as number of employment opportunities annually, abilities required, beginning salary, advancement opportunities, and promise of satisfaction.

Contributory objectives necessary to the attainment of this major objective include effective ability to:

1. Understand and appreciate the importance of agriculture to the nation's economy;
2. Determine the types and numbers of occupational opportunities in agriculture;
3. Locate and evaluate occupational information concerning agricultural occupations;
4. Assess pertinent occupational information in relation to personal characteristics and interests;
5. Select and obtain exploratory work experiences in selected occupations under proper supervision;
6. Appreciate the need for pursuing a program of continuing education to keep abreast of and advance in the occupation.

Objective 4. To develop the ability to secure satisfactory placement and advancement in an agricultural occupation

Successful placement in an occupation is the objective of all students of vocational education. It is important for students to become aware of occupational opportunities and the requirements of these jobs as they complete their preparation in their chosen field.

Much of the responsibility for developing needed abilities in this area rests with instructors in agriculture. Other competent persons who can assist should be enlisted to help prepare students for placement.

Contributory objectives necessary to the attainment of this major objective include the effective ability to:

1. Utilize the services of agencies and organizations in securing satisfactory placement;
2. Find an employment situation;
3. Analyze job opportunities and requirements;
4. Analyze and assess personal abilities and interests in terms of job requirements;
5. Apply for employment;

6. Participate in an employment interview;

7. Analyze opportunities for self-employment;

8. Advance in the occupation.

Objective 5. To develop those human relations skills and attitudes required for success in an agricultural occupation

Vocational education is not limited to the development of specific and narrow occupational competencies but also is concerned with the optimum development of each worker as a person. Occupational success is also influenced by the interpersonal relationships between the worker and his co-worker and society in general. In many instances the successful application of a specific occupational competency hinges on effective human relations.

Contributory objectives necessary to the attainment of this major objective include effective ability to:

1. Establish and maintain effective relationships with associates;

2. Communicate effectively;

3. Appreciate and exemplify desirable behavioral standards;

4. Develop acceptable personal habits;

5. Appreciate the dignity of work and the need for every individual to make his maximum contribution toward the advancement of his family, his community, and the nation.

Objective 6. To further develop leadership abilities and civic responsibilities

Participating experiences in the many intracurricular activities of the Future Farmers of America provide excellent opportunities for development of individual leadership and for cooperation with fellow members on common enterprises. The local, state and national organizational structure of leadership from officers and others elected by the members provides an educational laboratory in democratic leadership and citizenship.

Contributory objectives necessary to the attainment of this major objective include the effective ability to:

1. Cooperate for the common good in agricultural and civic activities;

2. Identify and effectively participate in desirable activities for continuing and improving agricultural leadership;

3. Develop and maintain desirable relationships with rural and urban groups;

4. Exercise and follow effective leadership;

5. Initiate programs that have a positive effect on agriculture and civic life;

6. Understand and effectively participate in the development of local, state, national, and international policies affecting agriculture.

GREATER USE OF INDIVIDUAL STUDY

It is generally recognized that students enrolled in many classes have divergent and yet related job objectives. This emphasizes the importance of individualized instruction. For the teacher of vocational agriculture, this technique of teaching is not new.

While the supervised study of students working individually on a variety of topics fitting them for the agricultural occupation of their choice may be more difficult, it can and should be done. A general pattern for studying an agricultural occupation can be agreed upon by the class. Students are interested in reports of classmates of information gained from study of agricultural occupations. There is no reason why one student should not be able to study and plan for becoming a teacher of agriculture, a farmer, or a soils laboratory assistant. If two or more are interested in the same occupation, they should be encouraged to work in groups. There will, of course, be some units of instruction which provide knowledge and skills common to several agricultural occupations and in these cases students may be expected to study similar material.

All students are expected to carry out a supervised experience program, and teachers should plan to take advantage of this program to provide individualized instruction.

Suggestions helpful in securing maximum educational value through experience programs are included in the brochure, Agricultural Experience Programs, Suggestions for Legal Employment of Minors - 1965, distributed earlier to Michigan agriculture teachers. An important aspect of the experience program is the training plan which provides for the development of competencies required for gainful employment in specific occupations and the need for classroom instruction to provide basic knowledge and understanding relating to these competencies. Experience programs must be supervised on a regular basis in order that classroom instruction and practical experiences may be closely coordinated.

OCCUPATIONAL FAMILIES AND JOB TITLES IN AGRICULTURE

Students in the eleventh and twelfth grades seeking to become gainfully employed in off-farm agricultural occupations will find a variety of job opportunities.

Several hundred job titles have been identified. Research clearly indicates that many of these jobs may be classified as a part of various occupational families or clusters. A recent study entitled "Off-Farm Agricultural Occupations in New York State" by Cushman, Christensen and Bice[1] identified the following twelve families of off-farm agricultural occupations most likely to develop in the next five years. These families involve 213 different job titles. It will be noted that some of the job titles indicated require additional training beyond high school.

Occupational Families	Job Titles (Examples)
1. Agricultural Machinery Sales and Service	Salesman Parts Manager Parts Helper

[1] "A Study of Off-Farm Agricultural Occupations in New York State" by Cushman, Harold R.; Christensen, Virgil E.; Bice, Garry R.; January, 1965.

	Mechanic Mechanic's Helper
2. Agricultural Supplies and Equipment	Fieldman Sales Clerk Stockboy Maintenance man Warehouse Foreman (grain and feed mill)
3. Landscape Horticulture	Salesman Sales Clerk Nurseryman Flower Raiser Landscape Gardener
4. Agricultural Service	County Agricultural Agent Agricultural Representative for Power Company Rural Insurance Representative Advertising Layout Man Office Manager Auctioneer
5. Forestry and Soil Conservation	Lumberman Soil Conservation Technician Agronomist Hook Tender (logger)
6. Dairy Manufacturing and Processing	Cheese Maker Ice Cream Maker Milk Inspector Laboratory Technician Condenserman
7. Livestock Marketing and Processing	Manager Salesman Bookkeeper Sales Clerk Buyer
8. Other Livestock Industry	Manager Bookkeeper Veterinarian's Assistant Foreman Stock Tender
9. Poultry Industry	Manager Debeaker Incubator Specialist
10. Crops Marketing and Processing	Assistant Manager Fieldman Bookkeeper Packer Grader

11. Wildlife and Recreation	Guide Wildlife Specialist Park Attendant Youth Camp Director Camp Grounds Caretaker
12. Farm Service	Artificial Inseminator Crop Sprayer Dairy Herd Improvement Supervisor Combination Welder

AREAS OF AGRICULTURAL COMPETENCY MOST NEEDED IN VARIOUS OCCUPATIONAL FAMILIES

In building a course of instruction designed to prepare students for gainful employment in a particular job it is important to know the kind of competencies required to perform that job successfully. The New York Study referred to earlier asked employers to indicate what agricultural competencies were needed most by their workers. These are listed below in rank order beginning with the one needed by the highest proportion of full time workers in each occupational family. Only the top quartile of the rankings are listed.

AGRICULTURAL MACHINERY SALES AND SERVICE

1. Display, explain and demonstrate items for sale.
2. Order repair parts and new equipment.
3. Understand and use credit.
4. Make job estimates.
5. Sell machinery, equipment, materials, products or supplies.
6. Keep, summarize and analyze records.
7. Arc or oxy-acetylene welding abilities.
8. Operate, maintain and adjust gasoline engines.
9. Operate, maintain and adjust tractors, trucks, agricultural equipment and agricultural machinery.
10. Knowledge of fuels and lubricants.
11. Operate, maintain and adjust diesel engines.

AGRICULTURAL SUPPLIES AND EQUIPMENT

1. Operate, maintain and adjust gasoline engines.
2. Operate, maintain and adjust diesel engines.
3. Install and use materials handling equipment.
4. Understand and use credit.
5. Knowledge of blueprints, space requirements and building materials for agricultural structures.
6. Woodworking and metal working skills.
7. Sell machinery, equipment, materials, products or supplies.
8. Operate, maintain and adjust tractors, trucks, agricultural equipment and agricultural machinery.
9. Investigate and adjust customer complaints.
10. Arc or oxy-acetylene welding abilities.
11. Make job estimates.
12. Display, explain and demonstrate items for sale.
13. Order repair parts and new equipment.

14. Keep, summarize and analyze records.
15. Handle inventories, stock control warehousing reports, payrolls and accounts.
16. Knowledge of fuels and lubricants.
17. Call on prospective customers.
18. Purchase goods to sell.
19. Plan and arrange for advertising and promotion.
20. Understand agriculture in our economy.

LANDSCAPE HORTICULTURE

1. Prepare seed beds.
2. Plant seeds, bulbs, trees or shrubs.
3. Perform proper tillage practices.
4. Operate, maintain and adjust gasoline engines.
5. Control insects, diseases and weeds.
6. Operate, maintain and adjust garden machines and equipment.
7. Maintain trees and shrubs.
8. Maintain lawns.
9. Manage nursery, planting, transplanting, pruning, shaping and trimming.
10. Correct physical defects of sites being landscaped.
11. Knowledge of paint and painting.
12. Make lime or fertilizer recommendations.
13. Choose proper planting sites.
14. Operate, maintain and adjust tractors, trucks,agricultural equipment and agricultural machinery.
15. Locate and design drives, walks and fences.
16. Provide seasonal protection to ornamental plants.
17. Decide what to grow.
18. Select varieties.
19. Select seed, cuttings, bulbs or stock plants.
20. Mix soil composites.
21. Knowledge of characteristics and appropriate use of landscaping materials.
22. Select, buy, adjust or maintain lawn and garden sprinkler and irrigation equipment.

AGRICULTURAL SERVICE

1. Keep, summarize and analyze records.
2. Evaluate the total operation and make decisions.
3. Understand and use credit.
4. Provide for insurance.
5. Investigate and adjust customer complaints.
6. Comply with local, state and federal government trade and licensing regulations.
7. Call on prospective customers.
8. Display, explain and demonstrate items for sale.
9. Use legal instruments: wills, deeds, contracts, mortgages, notes.
10. Understand agriculture in our economy.
11. Handle inventories, stock control, warehousing reports, payrolls, accounts.
12. Plan and arrange for advertising and promotion.
13. Prepare tax returns.
14. Arc or oxy-acetylene welding abilities.
15. Operate, maintain and adjust tractors, trucks, agricultural equipment and agricultural machinery.
16. Knowledge of fuels and lubricants.
17. Operate, maintain and adjust gasoline engines.
18. Woodworking or metal working tool skills.

19. Make job estimates.
20. Knowledge of paint and painting.
21. Hire, train and supervise workers.
22. Order repair parts and new equipment.
23. Control insects, diseases and weeds.
24. Make lime or fertilizer recommendations.
25. Choose proper planting sites.
26. Know insurance and safety regulations.
27. Recommend soil management practices.
28. Provide seasonal protection to ornamental plants.
29. Prepare seed beds.
30. Perform proper tillage practices.
31. Select varieties.

FORESTRY AND SOIL CONSERVATION

1. Identify trees of economic importance.
2. Fell, trim, skid and haul logs and pulp.
3. Operate chain saws and other power equipment.
4. Saw, grade, store and haul lumber.
5. Lay out, build and open woods roads.
6. Select, repair and maintain chain saws.
7. Handle inventories, stock control, warehousing reports, payrolls, accounts.
8. Hire, train and supervise workers.
9. Keep, summarize and analyze records.
10. Evaluate the total operation and make decisions.
11. Understand agriculture in our economy.
12. Identify and control common insects and diseases.
13. Arc or oxy-acetylene welding abilities.
14. Operate, maintain and adjust gasoline engines.
15. Operate, maintain and adjust tractors, trucks, agricultural machinery.
16. Farm carpentry.
17. Planning for efficient use of buildings and equipment.
18. Knowledge of paint and painting.

DAIRY MANUFACTURING AND PROCESSING

1. Keep, summarize and analyze records.
2. Sanitation and disease control practices.
3. Produce high quality products.
4. Operate, maintain and adjust tractors, trucks, agricultural equipment and agricultural machinery.
5. Ability to test animal products.
6. Knowledge of grades and standards.
7. Knowledge of blueprints, space requirement and building materials for agricultural structures.
8. Handle inventories, stock control, warehousing reports, payrolls, accounts.
9. Understand agriculture in our economy.
10. Hire, train and supervise workers.
11. Order repair parts and new equipment.
12. Evaluate the total operation and make decisions.

LIVESTOCK MARKETING AND PROCESSING

1. Knowledge of markets and marketing practices.
2. Knowledge of grades and standards.
3. Sanitation and disease control practices.
4. Pasteurize milk.
5. Hire, train and supervise workers.
6. Understand agriculture in our economy.
7. Display, explain and demonstrate items for sale.
8. Investigate and adjust customer complaints.
9. Comply with local, state and federal government trade and licensing regulations.
10. Plan and arrange for advertising and promotion.
11. Call on prospective customers.
12. Make job estimates.
13. Ability to test animal products.

OTHER LIVESTOCK INDUSTRY

1. Sanitation and disease control practices.
2. Ability to test animal products.
3. Produce high quality products.
4. Knowledge of grades and standards.
5. Keep production, breeding and financial records.
6. Knowledge of markets and marketing practices.
7. Housing and handling.
8. Feeding requirements and practices.
9. Use records to improve feeding, breeding and other practices.
10. Knowledge of breeding principles and practices.
11. Evaluate the total operation and make decisions.
12. Hire, train and supervise workers.
13. Purchase goods to sell.
14. Keep, summarize and analyze records.
15. Comply with local, state and federal government trade and licensing regulations.
16. Understand agriculture in our economy.

POULTRY INDUSTRY

(Insufficient number of employers interviewed to be significant.)

CROPS MARKETING AND PROCESSING

1. Process, grade or package.
2. Shipping or storing.
3. Operate, maintain and adjust tractors, trucks, agricultural equipment and agricultural machinery.
4. Comply with local, state and federal government trade and licensing regulations.
5. Understand and use credit.
6. Understand agriculture in our economy.
7. Use legal instruments: wills, deeds, contracts, mortgages, notes.
8. Keep, summarize and analyze records.
9. Select seed, cuttings, bulbs or stock plants.
10. Sell machinery, equipment, materials, products or supplies.
11. Call on prospective customers.
12. Investigate and adjust customer complaints.
13. Evaluate the total operations and make decisions.

WILDLIFE AND RECREATION

1. Know insurance and safety regulations.
2. Operate turf equipment such as mower, fertilizer spreaders and irrigation equipment.
3. Operate, maintain and adjust gasoline engines.
4. Locate and design drives, walks, fences.
5. Establish lawns.
6. Operate, maintain and adjust tractors, trucks, agricultural equipment and agricultural machinery.
7. Arrange, organize and manage an agricultural shop facility.
8. Manage camp grounds and trailer camps.
9. Knowledge of paint and painting.
10. Correct physical defects of sites being landscaped.
11. Provide for insurance.
12. Control birds and animals injurious to plants.
13. Control insects, diseases and weeds.
14. Prepare seed beds.
15. Plant seeds, bulbs, trees, or shrubs.
16. Keep essential records.
17. Know public health laws.
18. Select and buy farm machinery or garden tools, equipment and machinery.
19. Farm carpentry.
20. Concrete, masonry and tile skills.
21. Knowledge of fuels and lubricants.
22. Keep, summarize and analyze records.
23. Use fire fighting tools and equipment.
24. Woodworking or metal working tool skills.
25. Knowledge of characteristics and appropriate use of landscaping materials.
26. Handle inventories, stock control, warehousing reports, payrolls, accounts.
27. Prepare tax returns.
28. Operate chain saws and other power equipment.
29. Know game laws.

FARM SERVICE

1. Investigate and adjust customer complaints.
2. Operate, maintain and adjust tractors, trucks, agricultural equipment and agricultural machinery.
3. Keep, summarize and analyze records.
4. Woodworking or metal working tool skills.
5. Arc or oxy-acetylene welding abilities.
6. Operate, maintain and adjust gasoline engines.
7. Call on prospective customers.
8. Understand and use credit.
9. Understand agriculture in our economy.
10. Knowledge of blueprints, space requirements, and building materials for agricultural structures.
11. Operate, maintain and adjust garden machines and equipment.
12. Knowledge of paint and painting.

It will be noted from a study of the above listings that the areas of competencies cut across several occupational families. Identification of common competencies within these families may be helpful in developing a course of instruction.

BIBLIOGRAPHY

Agricultural Machinery Sales and Service

Wilson, L. W. Farm and Power Equipment Retailers Handbook. National Farm and Power Equipment Dealers Association, 2340 Hampton Avenue, St. Louis, Missouri, 1964.

Franzee, Irving; Bedell, Earl L. Tractors and Crawlers, American Technical Society, Chicago, Illinois, 1963.

Henderson, G. E.; Turner, J. Howard. Tractor Maintenance - Principles and Procedures, Southern Association Agricultural Engineers and Vocational Agriculture, Barrow Hall, Athens, Georgia, 1964.

Henderson, G. E.; Turner, J. Howard. Tractor Fuels and Lubricants, Southern Association Agricultural Engineers and Vocational Agriculture, Barrow Hall, Athens, Georgia, 1964.

Henderson, G. E.; Turner, J. Howard. Farm Tractor Tune-Up and Service Guide, Southern Association Agricultural Engineers and Vocational Agriculture, Barrow Hall, Athens, Georgia, 1963.

Parts Sales Manual. John Deere, Inc., Moline, Illinois.

Dealers Management Manual, International Harvester Co., 180 N. Michigan Avenue, Chicago, Illinois.

Parts Purchasing Control Procedure. Massey-Ferguson, Co., 3525 West Peterson Rd., Chicago, Illinois.

Farm Tractors-Basic Principles, Operation and Maintenance, American Oil Company, New York City, New York, Engineering Bulletin No. FT-53.

Gulf Farm Tractor Guide, Gulf Oil Corporation, Gulf Building, Houston, Texas, No. SP10293.

Tractor Maintenance and Tune-Up. International Harvester Company, 180 North Michigan Avenue, Chicago 1, Illinois, 1962.

Ford Tractor-Shop Manual, Tractor and Implement Division, Ford Motor Company, Dearborn, Michigan, 1955-1960.

Agricultural Supplies and Equipment

Serif, Ned (ed). How to Manage Yourself. Volume 1. Available from Cities Service Oil Company, Business Research and Education Division-Marketing Training Department, 60 Wall St., New York 5, New York, (paperback), 1961.

Wilson, Howard. Living With Yourself. Administrative Research Associates, Box 3, Deerfield, Illinois, 65 pp. (paperback), 1962.

Wilson, Howard. Understanding People. Administrative Research Associates, Box 3, Deerfield, Illinois, 63 pp. (paperback), 1962.

Byram, Harold M. Guidance in Agricultural Education. Danville, Illinois: The Interstate, 1959.

Hemp, Paul E. and Krebs, Alfred H. "A Study Guide for Placement-Employment Programs in Agricultural Business and Industry", Danville, Illinois: The Interstate, 1964.

Hoover, Norman K. Handbook of Agricultural Occupations, Danville, Illinois: The Interstate, 1964.

James, Gerald B. "Vocational and Technical Education", Using Current Curriculum Developments, Washington: Association for Supervision and Curriculum Development, National Education Association, 1963.

Phipps, Lloyd J. Your Opportunities in Vocational Agriculture. Danville, Illinois: The Interstate, 1962.

Richert, G. H., Meyer, W. G., and Haines, P. G. Retailing Principles and Practices, Fourth Edition, New York: Gregg Publishing Division, McGraw-Hill Book Company, Inc., 1962.

Weyant, J. Thomas, Hoover, Norman K. and McClay, Davis R. An Introduction to Agricultural Business and Industry, Danville, Illinois: The Interstate (to be published June, 1965), a student's test of approximately 200 pages and a teacher's guide.

Phillips. Managing for Greater Returns, Agri-Research Inc., Manhattan, Kansas. 551 pp.

Robinson-Blackler-Logan. Store Salesmanship, 5th Edition, Prentice Hall, Inc., Englewood Cliffs, New Jersey. 365 pp.

Wingate-Nolan. Fundamentals of Selling, 7th Edition. Southwestern Publishing Company, Cincinnati, Ohio. 684 pp.

Rowse-Nolan. Fundamentals of Advertising, 6th Edition. Southwestern Publishing Company, Cincinnati, Ohio. 442 pp.

Wingate-Weiner. Retail Merchandising, 5th Edition. Southwestern Publishing Company, Cincinnati, Ohio. 634 pp.

Richert-Meyer-Haines. Retailing Principles and Practices, 4th Edition. McGraw-Hill Company, Inc., New York.

Ernest-Da Vall. Salesmanship Fundamentals, 2nd Edition. McGraw-Hill Book Company, Inc., New York.

Education an Investment in People. Education Department, Chamber of Commerce of the United States, Washington, D. C. 20006.

Forestry

Sharpe, G. W. An Introduction to American Forestry (3rd Ed.). New York: McGraw-Hill Book Co., Inc., 1960.

Harlow, W. M., and Harrar, E. S. Textbook of Dendrology. New York: McGraw-Hill Book Co., Inc., 1958.

Mirov, N. T. "The Tree Is a Living Thing", Trees, Yearbook of Agriculture, U. S. Department of Agriculture, Washington, D. C.: U. S. Government Printing Office, 1949.

Dilworth, J. R. Log Scaling and Timber Cruising. Corvallis, Oreg.: The Oregon State University Press, 1964.

Forbes, R. D. Forestry Handbook. New York: The Ronald Press Co., 1955.

U. S. Department of Interior, Bureau of Land Management. Career Opportunities in Bureau Land Management for Foresters. Washington, D. C.: U. S. Government Printing Office, 1958.

Forest Land Use--Everybody's Concern. Washington, D. C.: American Forest Products Industries, Inc., 1962.

Our Forest Bounty. Washington, D. C.: American Forest Products Industries, Inc., 1961.

The Story of Lumber. Washington, D. C.: American Forest Products Industries, Inc., Reprinted 1961.

The Story of Pulp and Paper. Washington, D. C.: American Forest Products Industries, Inc., Reprinted 1961.

Landscape Horticulture

Pinney, John J., Beginning in the Nursery Business, available from American Nurserymen, 343 South Dearborn Street, Chicago, Illinois 60604

Bradshaw, John, Guide to Better Gardening Series, Distributed by Vaughn Seed Company, Downers Grove, Illinois.

Christopher, E. P., Introductory Horticulture, McGraw-Hill, New York, 1958.

Janick, Jules, Horticulture Science, W. F. Freeman Company, San Francisco, 1963.

Lyon and Buckman, The Nature and Properties of Soil, MacMillan, New York, 1954.

Science Research Associates, Inc., Occupational Brief, No. 166, 259 East Eve Street, Chicago 11, Illinois.

Society of American Florists, Opportunities for You in the Florist Industry, Sheraton-Park Hotel, Washington 8, D. C.

Available from American Nurseryman, 343 South Dearborn Street, Chicago, Illinois:

Conover, H. S., Grounds Maintenance Handbook, McGraw-Hill, 1958.

Hartman and Kester, Plant Propagation: Principles and Practices, Prentice-Hall, 1959.

Musser, H. B., Turf Management, McGraw-Hill, New York, 2nd edition.

Pirone, Dodge, and Rickett, Diseases and Pests of Ornamental Plants, 1960.

Pirone, P. P., Tree Maintenance, Oxford University Press, New Jersey, 1959.

Other Sources

Two bibliographies, one consisting of available bulletins and the other available books for use in teaching ornamental horticulture and related subjects were developed recently by Dr. Raymond Clark, Professor of Education, Michigan State University, and are available upon request from the College of Education, Michigan State University, East Lansing, Michigan, as long as the supply lasts.

Publications On Occupational Information in Agriculture - A Selected Annotated List of Recently Published Materials by Dr. Harold Byram, Professor of Education, Michigan State University and James J. Albracht, Graduate Assistant, Michigan State University is available upon request from the College of Education, Michigan State University, East Lansing, Michigan, as long as the supply lasts.